



US009636897B2

(12) **United States Patent**
Taniuchi et al.

(10) **Patent No.:** **US 9,636,897 B2**

(45) **Date of Patent:** **May 2, 2017**

(54) **MANUFACTURING METHOD OF
STRUCTURE AND MANUFACTURING
APPARATUS**

(58) **Field of Classification Search**

CPC . B32B 37/02; B29C 67/0051; B29C 67/0092;
G03G 15/224

(Continued)

(71) Applicant: **CANON KABUSHIKI KAISHA,**
Tokyo (JP)

(72) Inventors: **Hiroshi Taniuchi,** Yokohama (JP);
Kazuhiro Nakajima, Yokohama (JP)

(73) Assignee: **Canon Kabushiki Kaisha,** Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 467 days.

(56)

References Cited

U.S. PATENT DOCUMENTS

5,506,607 A 4/1996 Sanders, Jr. et al.
5,876,550 A 3/1999 Feygin

(Continued)

FOREIGN PATENT DOCUMENTS

CN 101561674 A 10/2009
EP 0712050 A2 5/1996

(Continued)

(21) Appl. No.: **14/240,009**

(22) PCT Filed: **Jun. 17, 2013**

(86) PCT No.: **PCT/JP2013/003759**

§ 371 (c)(1),

(2) Date: **Feb. 20, 2014**

Primary Examiner — Philip Tucker

Assistant Examiner — John Blades

(74) *Attorney, Agent, or Firm* — Canon U.S.A. Inc., IP
Division

(87) PCT Pub. No.: **WO2013/190817**

PCT Pub. Date: **Dec. 27, 2013**

(65) **Prior Publication Data**

US 2014/0182775 A1 Jul. 3, 2014

(30) **Foreign Application Priority Data**

Jun. 19, 2012 (JP) 2012-137917

(51) **Int. Cl.**

B32B 37/02 (2006.01)

G03G 15/22 (2006.01)

B29C 67/00 (2017.01)

(52) **U.S. Cl.**

CPC **B32B 37/02** (2013.01); **B29C 67/0059**
(2013.01); **B29C 67/0074** (2013.01);

(Continued)

(57)

ABSTRACT

A manufacturing method of a structure includes providing a stack of a first material layer to be a part of the structure and a restricting member wherein the first material layer is provided on a surface of the structure in the process of formation, and a part of the restricting member is provided on a surface of the first material layer in reverse of the surface of the structure in the process of formation, providing a support member between the restricting member and the surface of the structure in the process of formation, removing the restricting member, and providing a second material layer to be a part of the structure on surfaces of the first material layer and the support member exposed by removing the restricting member.

14 Claims, 7 Drawing Sheets

